

Affordance and Design – Research Notes

Based on Don Norman's writings on affordances and interaction design

Affordance

The term **affordance** refers to the actionable properties that exist between the world and an actor (agent).

Key Characteristics:

- Affordances are **relationships**, not fixed properties
- They depend on both the object's characteristics and the actor's abilities
- **Example:** A chair affords "sitting" only for agents capable of sitting

Important Points:

- Affordances exist in nature regardless of whether they are visible, known, or desirable
- Some affordances remain undiscovered or are dangerous (e.g., toxic plants, weak surfaces)
- Most people don't fully know all the affordances of even everyday objects

Key Insight:

In design, the focus isn't just on what affordances exist — it's on **what the user perceives as possible**.

Perceived Affordance

Perceived affordances are what users believe they can do with an object or interface.

- Designers care more about user perception than about objective affordance — because the user's behavior depends on what they think they can do
- The designer's challenge is to make possible actions discoverable and intuitive

Example: Computer Interface

In a computer interface, the physical system (keyboard, mouse, screen) affords:

- Pointing, touching, clicking, dragging, typing

However, not every visible element on a screen is interactive.

Scenario:

- Even if a screen is not touch-sensitive, a user can physically touch it — but nothing will happen
- The affordance exists, but the system doesn't respond
- → **The perceived affordance matters more than the real one**

Design Implication:

- Designers of graphical interfaces have control only over **perceived affordances** — through layout, labels, icons, and feedback
 - Effective design makes these affordances visible, clear, and consistent
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Cultural Constraints and Conventions

Cultural constraints are learned conventions that guide behavior.

- They arise from shared expectations about how systems work, not from physical limitations

Examples:

- Knowing how to scroll — click, hold, and drag down — is a learned cultural behavior
- Scroll bars move vertically (not horizontally) because of both physical and cultural constraints
- Clicking "X" means close, "trash can" means delete — these are culturally standardized metaphors

Design Relevance:

- When interfaces follow cultural conventions, users immediately understand what to do
 - Breaking conventions can cause confusion — unless the violation is intentional (e.g., "secret back doors" for advanced users or developers)
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What Matters in Design

When evaluating affordances in interactive systems, two key questions determine usability:

1. Can the user perceive what controls are available?

- In easy-to-use systems, controls should be visible, intuitive, and interpretable

2. Can the user discover what actions are possible?

- Are conventions followed?
- Is the mapping between action and result consistent?

If both are true, users can learn and act effectively.

When they are violated (e.g., hidden menus, misleading icons), users struggle.

Design Principles for Screen Interfaces

Norman identifies four principles for helping new users understand what to do.

These align strongly with game interface design and AI-based affordance prediction.

1. Follow Conventional Usage

- Use standard images and interactions whenever possible
- Human culture changes slowly — users rely on learned behaviors
- Designers who break conventions (even with good intentions) risk failure

Implication:

In games or tools, consistent design schemas help users transfer prior knowledge.

2. Use Words to Describe Desired Actions

- Combine words and graphics to clarify function
- Labels (e.g., "jump," "grab," "exit") help users connect visual affordances to meaning

3. Use Metaphors

- Metaphors help users understand new systems by linking them to familiar experiences
- **Example:** Desktop = physical workspace

Caution:

- Metaphors can be misinterpreted or taken too literally
- A user might try to perform unintended actions if the metaphor implies the wrong affordance
- Still, metaphors are valuable for teaching users quickly

4. Maintain a Coherent Conceptual Model

- Once users learn one part of the interface, the same principles should apply elsewhere
- A consistent conceptual model builds predictability and trust

Example:

If "E" always means interact, users expect it to do so throughout the game.

Connection to Game Affordance Net

Concept	Definition	Application to AI
Affordances	Define what actions are geometrically and functionally possible	Learn from 3D geometry
Perceived Affordances	How players interpret objects visually	AI learns from visual cues (shape, texture, lighting)
Cultural Constraints	Reflect genre norms	Red barrels explode, ladders can be climbed
Design Principles	How affordances are communicated	Consistent feedback, visual mapping, contextual hints

In other words:

Norman's design theory offers a human-centered framework for how AI affordance predictions should be presented, understood, and acted upon in gameplay.

Quotes to Remember:

"The word affordance refers to the actionable properties between the world and an actor." – Don Norman

"In design, what matters is not what is true, but what the user perceives to be true."

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